

Use of antibiotics in Pediatric Dentistry: Not a child's play

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Abstract

Antibiotics are commonly used in dentistry for prophylactic as well as for therapeutic purposes. Most often antibiotics are used in unwarranted situations, which may give rise to resistant bacterial strains. Dentists want to make their patients well and to prevent unpleasant complications. These desires, coupled with the belief that many oral problems are infectious, stimulate the prescribing of antibiotics. Good knowledge about the indications of antibiotics is the need of the hour in prescribing antibiotics for dental conditions.

Keywords: Antibiotics, Antibiotic Resistance, Antibiotic Prophylaxis, Paediatric Antibiotics

Introduction

In the past few decades there has been a rapid and dramatic increase in the therapeutic and prophylactic use of antibiotics in dental practice. Before prescribing antibiotics there should be adequate knowledge of patient's oral disease, systemic condition and understanding of antibiotic therapy. Unwarranted use of antibiotics are reported in children mostly for ear and dental infections.⁽¹⁾ American Dental Association Council on Scientific Affairs stated that in children increasing microbial resistance to antibiotics is well-documented and is a serious global health concern.⁽²⁾ World Health Organization has recognized this growing global problem and has pressed for an international action. They announced the theme for the year 2011 as "Antibiotic resistance: No action today, No cure tomorrow".

Uses and abuses of antibiotics should be familiar to all clinicians as they are commonly prescribed in dental practice. Metabolism of drugs is different in children and they have different vulnerability to oral and systemic diseases than adults. In patients antibiotics are mainly prescribed to relieve the symptoms. Whereas signs and symptoms often improve with the drugs but then reappear after discontinuation. The purpose of this paper is to provide a review about the use of antibiotics in paediatric dentistry with special emphases on the consequences of misuse of antibiotics.

Dental conditions and antibiotic therapy

A. CONDITION THAT MAINLY REQUIRE THE ANTIBIOTICS IN PEDIATRIC PATIENTS

I. Odontogenic infections

In cases of fever associated with dental problem, infection is acute or in cases of cellulitis antibiotic are advised. Topical antibiotics can also be used in odontogenic infections.

II. Topical antibiotics

Clindamycin has also been tried as a root canal dressing whereas clindamycin-resistant enterococci were recovered from the root canal 10 days after placement of the root canal dressing. Besides, it had no advantage over calcium hydroxide.⁽³⁾ Later on Triantibiotic paste (ciprofloxacin, metronidazole, minocycline): a combination of drugs was preferred due to the complexity of root canal infections. They were also known to reduce the development of resistant bacterial strains.⁽⁴⁾

III. Facial swelling

Immediate dental attention should be given to the child presenting with facial swelling due to dental infection. Intravenous antibiotic therapy and referral for medical management may be indicated.⁽⁵⁾

IV. Avulsion

Local application of an antibiotic to the root surface of an avulsed tooth with an open apex and less than 60 minutes extra oral dry time has been recommended to inhibit external resorption and aid in pulpal revascularization.⁽⁶⁾

V. Periodontal diseases

Culture and susceptibility testing of isolates from the involved sites are helpful in guiding the drug selection.⁽⁷⁾

VI. ANUG

ANUG is usually been associated with systemic complications such as fever, malaise and associated lymphadenopathy. Antibiotic therapy is indicated in addition to other methods of removing local irritants, improving oral hygiene and using oxidizing mouthwashes.

VII. Pericoronitis

Milder cases requires only conservative treatment. More serious infections can require antibiotics whereas in a survey it was stated that

there is no justification for routine antibiotic prophylaxis for third molar surgery.⁽⁸⁾

VIII. Systemic diseases and antibiotic usage

A. Diabetics

In case of severe infection and where blood sugar levels are not in normal limit, antibiotic support is required.

B. Renal Disease

Bear and Bottomley et al. recommended that patients with active renal disease should be covered with antibiotics for any oral surgical procedure.

C. Leukemia

Carey and Chilcote have advised that with granulocyte levels above 1,500/mm³, prophylactic antibiotic coverage is not necessary for dental treatment, but below this level coverage with penicillin V should be considered.

D. Heart diseases

The American Academy of Pediatric Dentistry (AAPD) endorses the American Heart Association's (AHA) guideline on prevention of infective endocarditis (IE).⁽⁹⁾

Antibiotic prophylaxis is recommended for all dental procedures that involve manipulation of the gingival tissue or periapical region of the teeth or perforation of the oral mucosa, in patients with high-risk cardiac conditions. Antibiotics given are amoxicillin and ampicillin. When allergic to penicillin drugs given are cephalexin, clindamycin, azithromycin, clarithromycin and cefazolin.

Roberts GJ found that tooth brushing twice a day for one year produced a 1, 54,000 times greater risk of exposure to bacteremia than a single tooth extraction. If other routine oral activities (such as chewing) are now applied to this model, then the number increases to 5.6 million times greater than that resulting from a single tooth extraction.⁽¹⁰⁾ Therefore, maintaining proper oral hygiene will prevent more bacterial endocarditis than antibiotic prophylaxis for dental treatment. However, adhering to the American Heart Association guidelines can be justified to prevent those trivial (4%) cases which may occur due to dental treatment.

B. CONDITIONS THAT DO NOT REQUIRE PRESCRIPTION OF ANTIBIOTICS IN PEDIATRIC PATIENTS

I. Mild trauma

In case of mild traumas antibiotics are not recommended.

II. Pulpitis

According to AAPD guidelines 2009, if a child presents with acute symptoms of pulpitis then treatment (pulpotomy, pulpectomy or extraction) should be rendered. Antibiotic

therapy usually is not indicated if the dental infection is within the pulpal tissue or in the immediate surrounding tissue. In this case, the child will have no systemic signs of infection (no fever or facial swelling).⁽¹¹⁾

III. Eruption and exfoliation of teeth

There is no evidence of a need for antibiotic coverage during tooth eruption or in normal exfoliation of primary teeth.

IV. Acute primary herpes infection

There is no role of antibiotics in treatment as causative agent in this case is a virus.

Antibiotic selection and dosages

For the prophylaxis of endocarditis associated with dental treatments, amoxicillin is the antibiotic of choice. Amoxicillin with clavulanic acid (clavulanate) can be used in certain cases, as it offers the advantage of preserving activity against the betalactamases commonly produced by microorganisms associated with odontogenic infections.⁽¹²⁾ If allergic to penicillin, clindamycin can be used.

Dosages

Pediatric patients due to difference in body size than adults cannot be given adult dosages of drug. Several rules exist to compute the dosage of a drug for a child, the most common is the Clark's rule and the Young's formula.

Some formulas for calculating drug dosage are:

Based on body weight (Clark's formula) – child dose = $\text{Weight (kg)}/70 \times \text{adult dose}$

Based on body surface area – child dose = $\text{body Surface area (m}^2\text{)}/1.7 \times \text{adult dose}$

Based on age (Young's formula) – child dose = $\text{age of child}/\text{age} + 12 \times \text{adult dose}$

Consequences of misuse of antibiotics

Overuse of antibiotics is becoming a major health problem causing antibiotic resistance especially in children. This will make once effective and less costly treatment ineffective increasing the treatment costs. Misuse of antibiotics is increasing the risk of super infections and development of resistant strains of bacteria. The rate at which resistant strains of bacteria is increasing day by day. Prestigious medical and public health authorities such as the Centers for Disease Control and Prevention (CDC), Institute of Medicine (IOM), Food and Drug Administration (FDA), World Health Organization (WHO) and the American Public Health Association (APHA) have cited bacterial resistance as an increasingly serious and costly medical and public health threat in need of much greater attention and action, including more education, research, and regulation. In case the tooth has infection causing accumulation of pus, in such cases prolonged use of antibiotics without proper drainage of pus can lead to a condition called antibioma. In this pus

localises and gets covered by a thick fibrous tissue cover. It is seen as a swelling which is painless, smooth and hard on palpation.

According to Dr Thomas J Pallasch⁽¹³⁾ antibiotic misuse in dentistry mainly involves prescribing them in 'inappropriate situations' or for too long, which includes, giving antibiotics after a dental procedure is complete in an otherwise healthy patient to 'prevent' an infection, which in all likelihood will not occur.

Conclusions

Appropriate and correct use of antibiotics is essential. It ensures that effective and safe treatment is available. Practices that may enhance microbial resistance should be avoided. To improve standards of care, there is necessity of some controlling body to reassess and limit the irrational use of drugs in children. Appropriate and correct use of antibiotics is essential to ensure that effective and safe treatment is available.

References

1. Tenover FC, Hughes JM. The challenges of emerging infectious diseases: development and spread of multiply-resistant bacterial pathogens. *J Am Med Assoc* 1996;275(4):300-304.
2. Smith A, Bagg J. An update on antimicrobial chemotherapy, 3: Antimicrobial resistance and the oral cavity. *Dent Update* 1998;25(6):230-234.
3. Karim IE, Kennedy J, Hussey D. The antimicrobial effects of root canal irrigation and medication. *Oral Surg Oral Med Oral Pathol Endod* 2007;103:560-569.
4. Takushige T, Cruz EV, Moral AA, Hoshino E. Endodontic treatment of primary teeth using a combination of antibacterial drugs. *Int Endod J* 2004;37:132-138.
5. Peterson LJ. Antibiotics for oral and maxillofacial infections. In: Newman MG, Kornman KS, eds. *Antibiotic/ Antimicrobial Use in Dental Practice*. St. Louis, Mo: Mosby; 1990:159-71.
6. Lee JY, Vann WF, Sigurdson AS. Management of avulsed permanent incisors: A decision analysis based on changing concepts. *Pediatr Dent* 2001;23(4):357-60.
7. Delaney JE, Keels MA. Pediatric oral pathology: Soft tissue and periodontal conditions. *Pediatr Clin North Am* 2000;47(5):1125-47.
8. Martin MV, Kanatas AN, Hardy P. Antibiotic prophylaxis and third molar surgery. *Br Dent J* 2005;198:327-330.
9. American Academy of Pediatric Dentistry (AAPD). Guideline on use of antibiotic therapy for patients at risk of infection: American Academy of Pediatric Dentistry (AAPD); 2007.
10. Roberts GJ. Dentists are innocent! "Everyday" bacteremia is the real culprit: a review and assessment of the evidence that dental surgical procedures are a principal cause of bacterial endocarditis in children. *Pediatr Cardiol* 1999;20:317-325.
11. Johnson BS. Oral infection: Principles and practice of antibiotic therapy. *Infect Dis Clin North Am* 1999;13(4):851-70.
12. Planells-del Pozo P, Barra-Soto MJ, Santa Eulalia-Troisfontaines E. Antibiotic prophylaxis in pediatric odontology. An update. *Med Oral Patol Oral Cir Bucal* 2006;11:E352-7.
13. Pallasch TJ. Global antibiotic resistance and its impact on the dental community. *Calif Dent Assn J* 2000 Mar;28(3):215-217.
14. Kutty N. Treating children without antibiotics in primary healthcare. *OMJ* 2011;26(5):303-305.
15. Little P. Delayed prescribing of antibiotics for upper respiratory tract infection. *BMJ* 2005;331(7512):301-302.